

CLAIMS

We claim:

1. A method of fabricating a corrugated laminate panel, comprising:
 - (a) providing a base tool having contoured grooves in an outer surface;
 - (b) providing a roller having a rotating shaft and a lobed member mounted on the shaft, the lobed member having lobes that match the contours of the grooves;
 - (c) aligning a layer of prepreg fabric with the grooves of the base tool, the fabric being located between the base tool and the roller; then
 - (d) moving the roller across the grooves of the base tool and sequentially engaging the grooves and pressing the fabric into the grooves with the lobes; then
 - (e) curing the fabric.
2. The method of claim 1, further comprising:

prior to step (e), repeating steps (c) and (d) with additional layers of fabric to form a multilayered panel.
3. The method of claim 1, further comprising:

maintaining a selected tension in the fabric as the lobes press the fabric into the grooves.

4. The method of claim 1, wherein:

step (b) comprises wrapping the lobed member around the shaft.

5. The method of claim 1, wherein:

step (e) comprises applying pressure and heat to the layers of fabric.

6. The method of claim 1, wherein:

step (b) comprises providing a flexible strip that, when laid out, has undulations that match the grooves of the base tool, then wrapping the strip around the shaft and fastening ends of the strip together to define the lobed member; and

step (e) comprises removing the lobed member and laying it on the base tool with the lobes located in the grooves, then applying pressure and heat to the lobed member to cure the fabric.

7. The method of claim 1, wherein:

step (b) comprises providing a flexible strip that, when laid out, has undulations that match the grooves of the base tool, then wrapping the strip around the shaft and fastening ends of the strip together to define the lobed member; and

step (e) comprises removing the lobed member and laying it on the base tool with the lobes located in the grooves, then enclosing the base tool, the stiffener, and the lobed member within a vacuum bag and withdrawing air from within the bag, air pressure outside of the bag forcing the lobed member and base tool toward each other for compacting the stiffener.

8. The method of claim 1, wherein:

steps (a) and (b) comprise providing the grooves of the base tool and the lobes of the lobed member with a sine-wave profile.

9. The method of claim 1, further comprising:

retaining the fabric at a first end of the base tool by using a clamp.

10. A method of fabricating a corrugated laminate panel, comprising:

- (a) providing a base tool having contoured grooves in an outer surface;
- (b) providing a roller having a rotating shaft and a lobed, elastomeric member, the elastomeric member having lobes that match the contours of the grooves;
- (c) aligning a layer of prepreg fabric with the grooves of the base tool, the fabric being located between the base tool and the roller; then
- (d) installing the fabric onto the base tool by moving the roller across the grooves of the base tool, the lobes sequentially engaging the grooves and pressing the fabric into the grooves, the fabric conforming to the contours of the grooves during a pass of the

roller over the base tool from a first end of the base tool to a second end of the base tool; then

- (e) repeating steps (c) and (d) with additional layers of fabric to form a multilayered stiffener, the roller applying one of the additional layers of fabric during each pass over the base tool; then
- (f) curing the layers of fabric on the base tool.

11. The method of claim 10, further comprising:

maintaining a selected tension in the fabric as the lobes press the fabric into the grooves.

12. The method of claim 10, wherein:

step (b) comprises wrapping the elastomeric member around the shaft.

13. The method of claim 10, wherein:

step (e) comprises applying pressure and heat to the layers of fabric.

14. The method of claim 10, wherein:

step (b) comprises providing a flexible strip that, when laid out, has undulations that match the grooves of the base tool, then wrapping the strip around the shaft and fastening ends of the strip together to define the elastomeric member; and

step (e) comprises removing the elastomeric member and laying it on the base tool with the lobes located in the grooves, then applying pressure and heat to the elastomeric member to cure the fabric.

15. The method of claim 10, wherein:

step (b) comprises providing a flexible strip that, when laid out, has undulations that match the grooves of the base tool, then wrapping the strip around the shaft and fastening ends of the strip together to define the elastomeric member; and

step (e) comprises removing the elastomeric member and laying it on the base tool with the lobes located in the grooves, then enclosing the base tool, the stiffener, and the elastomeric member within a vacuum bag and withdrawing air from within the bag, air pressure outside of the bag forcing the elastomeric member and base tool toward each other for compacting the stiffener.

16. The method of claim 10, wherein:

steps (a) and (b) comprise providing the grooves of the base tool and the lobes of the elastomeric member with a sine-wave profile.

17. The method of claim 10, further comprising:

retaining the fabric at a first end of the base tool by using a clamp.

18. A method of fabricating a corrugated laminate stiffener panel, comprising:

- (a) providing a base tool having contoured grooves in an outer surface;
- (b) providing a roller having a rotating shaft, wrapping an elastomeric member around the shaft, and fastening ends of the elastomeric member to each other, the elastomeric member having lobes that match the contours of the grooves;
- (c) aligning a layer of prepreg fabric with the grooves of the base tool, the fabric being located between the base tool and the roller; then
- (d) installing the fabric onto the base tool by moving the roller over the base tool, the lobes sequentially engaging the grooves and pressing the fabric into the grooves, the fabric conforming to the contours of the grooves during a pass of the roller over the base tool from a first end of the base tool to a second end of the base tool; then
- (e) repeating steps (c) and (d) with additional layers of fabric to form a multilayered stiffener, the roller applying one of the additional layers of fabric during each pass over the base tool; then
- (f) releasing the ends of the elastomeric member from each other, unwrapping the elastomeric member from the shaft, and placing the elastomeric member over the base tool, the lobes aligning with and locating within the grooves when the elastomeric member is released from the shaft and placed on the base tool; then
- (g) enclosing the base tool, the stiffener panel, and the elastomeric member within a vacuum bag and withdrawing air from within the bag, air pressure outside of the bag urging the elastomeric member and base tool toward each other; then
- (h) applying heat to cure the stiffener panel on the base tool.

19. The method of claim 18, further comprising:

maintaining a selected tension in the fabric as the lobes press the fabric into the grooves.

20. An apparatus for fabricating a corrugated laminate panel, comprising:

a base tool having contoured grooves in an outer surface; and

a roller having a shaft and a flexible, lobed member, the lobed member being wrapped around the shaft and secured by opposing ends of the lobed member, the lobed member being rotatable and having lobes that match the contours of the grooves for sequentially engaging the grooves of the base tool during a pass of the shaft and the roller over the base tool from a first end of the base tool to a second end of the base tool; and wherein

the lobed member is releasable from the shaft by releasing the ends from each other, the lobed member being capable of flexing into a strip with the lobes aligning with and locating within the grooves when the strip is placed on the base tool.